

METHOD AND APPARATUS FOR USE OF ROTATIONAL USER INPUTS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims benefit of priority from U.S. Provisional Patent Application No. 60/346,237, filed Oct. 22, 2001, entitled "METHOD AND SYSTEM FOR LIST SCROLLING," and is hereby incorporated by reference herein. This application also claims benefit of priority from U.S. Provisional Patent Application No. 60/359,551, filed Feb. 25, 2002, entitled "TOUCH PAD FOR HAND-HELD DEVICE," and is hereby incorporated by reference herein. This application also claims benefit of priority from U.S. Provisional Patent Application No. 60/387,692, filed Jun. 10, 2002, entitled "METHOD AND APPARATUS FOR USE OF ROTATIONAL USER INPUTS," and is hereby incorporated by reference herein.

[0002] This application is also related to U.S. patent application Ser. No. 10/072,765, filed Feb. 7, 2002, and entitled "MOUSE HAVING A ROTARY DIAL," and hereby incorporated by reference herein.

BACKGROUND OF THE INVENTION 1. Field of the Invention

[0003] The present invention relates generally to a computing device and, more particularly, to a handheld computing device having a rotational input unit.

[0004] 2. Description of the Related Art

[0005] There exist today many styles of input devices for performing operations with respect to a consumer electronic device. The operations generally correspond to moving a cursor and making selections on a display screen. By way of example, the input devices may include buttons, switches, keyboards, mice, trackballs, touch pads, joy sticks, touch screens and the like. Each of these devices has advantages and disadvantages that are taken into consideration when designing the consumer electronic device. In handheld computing devices, the input devices are typically buttons and switches. Buttons and switches are generally mechanical in nature and provide limited control with regard to the movement of a cursor (or other selector) and the making of selections. For example, they are generally dedicated to moving the cursor in a specific direction (e.g., arrow keys) or to making specific selections (e.g., enter, delete, number, etc.). In the case of handheld personal digital assistants (PDAs), the input devices tend to utilize touch-sensitive display screens. When using a touch screen, a user makes a selection on the display screen by pointing directly to objects on the screen using a stylus or finger.

[0006] In portable computing devices such as laptop computers, the input devices are commonly touch pads. With a touch pad, the movement of an input pointer (i.e., cursor) corresponds to the relative movements of the user's finger (or stylus) as the finger is moved along a surface of the touch pad. Touch pads can also make a selection on the display screen when one or more taps are detected on the surface of the touch pad. In some cases, any portion of the touch pad may be tapped, and in other cases, a dedicated portion of the touch pad may be tapped. In stationary devices such as desktop computers, the input devices are generally selected

from keyboards, mice and trackballs. With a mouse, the movement of the input pointer corresponds to the relative movements of the mouse as the user moves the mouse along a surface. With a trackball, the movement of the input pointer corresponds to the relative movements of a ball as the user rotates the ball within a housing. Both mice and trackball devices generally include one or more buttons for making selections on the display screen.

[0007] In addition to allowing input pointer movements and selections with respect to a Graphical User Interface (GUI) presented on a display screen, the input devices may also allow a user to scroll across the display screen in the horizontal or vertical directions. For example, mice may include a scroll wheel that allows a user to simply roll the scroll wheel forward or backward to perform a scroll action. In addition, touch pads may provide dedicated active areas that implement scrolling when the user passes his or her finger linearly across the active area in the x and y directions. Both devices may also implement scrolling via horizontal and vertical scroll bars as part of the GUI. Using this technique, scrolling is implemented by positioning the input pointer over the desired scroll bar, selecting the desired scroll bar, and moving the scroll bar by moving the mouse or finger in the y direction (forwards and backwards) for vertical scrolling or in the x direction (left and right) for horizontal scrolling.

[0008] Further, consumer electronic products other than computers, such as cordless telephones, stereo receivers and compact-disc (CD) players, have used dials to enable users to select a phone number, a radio frequency and a specific CD, respectively. Here, typically, a limited-resolution display is used together with the dial. The display, at best, displays only a single item (number, frequency or label) in a low resolution manner using a character generator LCD. In other words, these devices have used single line, low resolution LCD readouts.

[0009] Thus, there is always a need for improved user input devices that facilitate greater ease of use of computing devices.

SUMMARY OF THE INVENTION

[0010] The present invention relates to improved approaches for users of computing devices to interact with graphical user interfaces. According to one aspect of the invention, a rotational user action supplied by a user at a user input device is transformed into linear action with respect to a graphical user interface. According to another aspect of the invention, a portion of an extended list of items is displayed by a graphical user interface and, through rotational user actions at a user input device, the portion of the list being displayed can be varied with welcomed ease of use. Although the type of computing device can vary, the invention is particularly well-suited for use with a media player.

[0011] The invention can be implemented in numerous ways, including as a method, system, device, apparatus, or computer readable medium. Several embodiments of the invention are discussed below.

[0012] As a portable media player, one embodiment of the invention includes at least: a storage disk drive that stores media content for each of a plurality of media items; a display screen that displays a portion of the media items at